

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

MAILED

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PAT.&T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TERUYUKI NAGATA, KATSUJI WATANABE,
YOSHITSUGU KONO, AKIHIRO TAMAKI
and TAKASHI KOBAYASHI

Appeal No. 94-1348
Application 07/760,771¹

HEARD: August 6, 1996

Before JOHN D. SMITH, GARRIS, and WEIFFENBACH, Administrative
Patent Judges.

WEIFFENBACH, Administrative Patent Judge.

¹Application for Patent filed September 17, 1991.

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Application 07/760,771

DECISION ON APPEAL

This appeal is from the examiner's final rejection of claims 1-12, which are all of the claims in the application. We reverse.

The invention is directed to a process for the continuous preparation of aniline from nitrobenzene. It is known in the art to make aniline by reacting nitrobenzene with hydrogen gas in the presence of a palladium or palladium-platinum catalyst at a temperature between 150° and 250°C. Appellants assert that their invention is an improvement over the prior art process in that the combination of 5-200 ppm carbon monoxide in the hydrogen gas with a zinc compound promotor in the catalyst in the hydrogenation of nitrobenzene results in a higher purity aniline product, i.e., a product having fewer impurities.²

Claim 1, which is reproduced below, is illustrative of the process of the claims on appeal:

1. A process for the continuous preparation of aniline wherein nitrobenzene is hydrogenated with hydrogen in an aniline

²See page 4, lines 13-16 of appellants' specification. See also the paragraph bridging pages 1 and 2 of the appeal brief and page 7, lines 5-7 and page 11, lines 10-29 of the appeal brief.

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solvent containing suspended therein a catalyst of palladium or palladium-platinum which is deposited on a lipophilic carbon having an oil absorbency of at least 100, at a temperature of from 150 to 250°C substantially in the absence of water while aniline and water formed in said reaction are continuously distilled off as vapor from the reaction product, and the concentration of nitrobenzene in the reaction solution is maintained at 0.01% by weight or less, which comprises adding a zinc compound selected from the group consisting of zinc oxide, zinc acetate, zinc oxalate and zinc nitrate to the reaction system as a promoter and adding carbon monoxide to the hydrogen at a concentration of 5-200 ppm.

The examiner relies on the following references as evidence of obviousness:

Graham et al. (Graham)	2,823,235	Feb. 11, 1958
Bhutani	3,935,264	Jan. 27, 1976
Habermann	4,772,750	Sep. 20, 1988
Mitsui Toatsu Kagaku K.K. ³ (Mitsui Toatsu)	JP 57-167946	Oct. 16, 1982

Hackh's Chemical Dictionary (Hackh's), Edited by J. Grant, McGraw-Hill, New York, Received in PTO Scientific Library on June 22, 1966, page 686.

Claims 1-12 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mitsui Toatsu taken together with Bhutani,

³This is the named applicant in the Kokai patent application. The inventors are Akihiro Tamaki et al.

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Graham, Habermann and Hackh's.⁴

Opinion

We have carefully reviewed the application record which led to this appeal and the respective positions advanced by appellants and the examiner for patentability of the appealed claims. For the reasons set forth below, we will not sustain the examiner's rejection under 35 U.S.C. § 103.

There is no dispute that the Mitsui Toatsu reference teaches manufacturing aniline by hydrogenation of nitrobenzene in an aniline solvent in the presence of a catalyst comprising palladium or palladium-platinum catalyst supported on oleophilic carbon having an oil absorbance of at least 100. Mitsui Toatsu further discloses that the temperature of the reaction is between 150° and 250°C, that the concentration of nitrobenzene in the reaction is kept below 0.05 wt.%, and that the aniline and water formed during the reaction are removed by distillation so as to

⁴This is a new ground of rejection. The original final rejection of all of the claims was withdrawn by the examiner. See page 3 of the examiner's answer.

carry out the reaction essentially in the absence of water.⁵ The reference does not disclose or suggest using in combination a zinc compound such as zinc acetate as a catalyst "promotor"⁶ and 5-200 ppm carbon monoxide in hydrogen gas during the hydrogenation process.

Bhutani discloses hydrogenation of dinitrotoluene to form toluene diamine. The hydrogenation is carried out in the presence of a catalyst consisting of platinum or palladium or mixtures thereof and in the presence of a relatively small proportion of carbon monoxide gas. The concentration of carbon monoxide gas used is from 0.05% to about 20% by volume based on the volume of hydrogen used in the reaction.⁷ Counsel for

⁵Paragraph bridging pages 1 and 2; pages 5, lines 1-10; and page 6, lines 12-14 of Mitsui Toatsu.

⁶On page 2 of their reply brief, appellants argue that "claims [on appeal] do not characterize the zinc compound used therein as a 'promoter' [sic]." While this is technically true, the claims must be interpreted in light of appellants' supporting specification. *In re Sneed*, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983). Appellants' specification states on page 8 that "a zinc compound is added to the reaction system as a promotor" Thus, irrespective of whether the claims state the zinc compound is a promotor, the claims are interpreted to mean that the zinc compound functions as a "promotor" as the term is understood by a person having ordinary skill in the art.

⁷Column 1, lines 59-65 and column 3, lines 7-11 of Bhutani.

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appellants noted at oral hearing that the 0.05% by volume disclosed by Bhutani converts to about 7000 ppm.⁸ Although the examiner's position is that the Bhutani reference would suggest adding carbon monoxide to eliminate "certain impurities," we note that the carbon monoxide was added to remove a particular undesirable by-product, namely, an N-alkyl toluene diamine. We further note that the Bhutani process does not involve the production of aniline.⁹

As for the Graham and Habermann references, the examiner has cited these references to establish it would have been within the skill of the art to employ a zinc compound as a promotor for catalysts. Because Graham teaches using chromium and iron compounds as promotors on palladium or palladium-platinum catalysts supported on carbon for use in hydrogenation and Habermann teaches using chromium, iron and zinc compounds as

⁸On page 5 of the appeal brief, appellants state that the 0.05 % by volume in Bhutani converts to 500 ppm. However, at oral hearing, counsel revised the conversion value to be about 7000 ppm because, according to counsel for appellants, the 500 ppm value was in error in that the conversion for the 0.05% by volume in Bhutani was mistakenly based on wt.%.

⁹Column 1, lines 13-68 of Bhutani.

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statistically insignificant. Although the examiner's position is reasonable when considering only the purity percent values for aniline, the examiner's consideration should not be limited to only the purity data. It is evident that the ppm of impurities, i.e. cyclohexanol, cyclohexanone, cyclohexylideneaniline and unreacted nitrobenzene, are significantly reduced when a combination of carbon monoxide and a zinc compound are used within the limits set forth in the appealed claims. Compare Experiments 1 and 2 to Experiments 5, 6 and 7 of the declaration and compare Examples 3-6 to Comparative Examples 2 and 3 in Table 1 on page 19 of the specification.

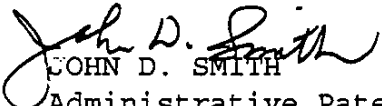

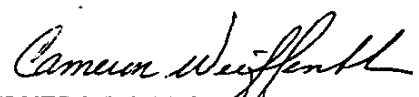
Considering as a whole all of the evidence of record in this application as well as the teachings of the prior art, we must conclude that the examiner's rejection for obviousness cannot stand. The references when taken together do not suggest using carbon monoxide in the hydrogenation process to produce aniline would reduce the amount of impurities in the final product. Although appellants admit that zinc compounds such as zinc acetate or zinc nitrate can be employed in a process for

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producing aniline by the hydrogenation of nitrobenzene, it is questionable whether this teaching combined with Bhutani would provide motivation or a suggestion to one having ordinary skill in the art to combine carbon monoxide with a zinc compound and expect to significantly reduce the amount of impurities produced in the aniline production process.

For the foregoing reasons, the examiner's rejection of claims 1-12 for obviousness is reversed.

REVERSED

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JOHN D. SMITH)	
Administrative Patent Judge)	
)	
BRADLEY R. GARRIS)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
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